Agtech for vineyard irrigation management

- Type of farm – corporate vineyard. (Josef Chromy Wines, owned by Endeavour Group) with vineyards in Tamar Valley and Coal River Valley
- Area – 61 ha at Relbia
- Soils – black cracking clay
- Irrigation – drip at Relbia vineyard

Kellie Graham, Viticulture & Site Manager, Josef Chromy Wines

Background to vineyard irrigation management

Infrastructure, including the drip irrigation, required an upgrade when the vineyard was taken over in 2022. This made it an ideal time to also trial irrigation related technologies to streamline operations. Involvement in a project funded by Wine Australia and further supported by Farmers 2 Founders under the Future Drought Fund allowed Kellie and Felipe to establish the agtech demo vineyard to trial a number of technology options to solve their irrigation issues.

Ag tech priorities

The team working at Josef Chromy, Relbia identified priorities for agtech adoption that were primarily associated with irrigation inefficiencies and the consequent impacts on yield variability and vine health. Kellie and Felipe wanted to enhance irrigation and water management decisions by using accurate, real-time, quantifiable data, and eliminate reliance on traditional and time-consuming practices of vineyard and vine health management. The vineyard had a number of existing data layers, in various formats, so integration of these layers and quantification of vineyard assets were also identified as priorities.

Kellie identified the opportunity to engage with Wine Australia to support the agtech demo vineyard program as a tech adoption project. Wine Australia engaged local advisers, Ag Logic, to project manage the agtech demo vineyard for the 2023-24 season and engage with solution providers to support the Josef Chromy team. Kellie and Felipe initially focussed on integrating multiple agtech platforms to create an all-in-one solution for irrigation management, enhancing vine health, improved wine quality, longer-term sustainability through accurate water budgeting, and increased time-use efficiency.

'The support of our project members, particularly the Ag Logic team and the agtech providers, was crucial to the project's success. We would not have achieved these positive outcomes without their collaborative efforts.

As a result of this project, we have refined our water and data management strategies, eliminating the need for guesswork. Drone and GIS technologies have provided a valuable long-term management tool offering easily accessible digital platforms and replacing the reliance on traditional but clumsy paper-based mapping.

Time banking proved to be an unexpected yet welcome benefit of this project. Vineyard managers now have access to a trusted platform that frees up their time to address other critical operational tasks.' – Kellie Graham, Viticulture & Site Manager

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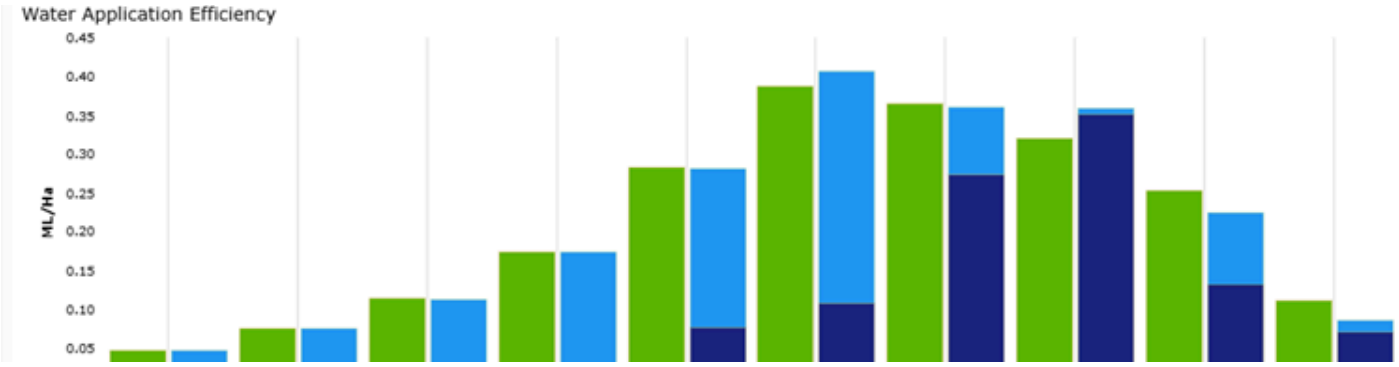
Challenges

- Data integration - need all suppliers to talk with one another. Regular meetings with the vineyard team and suppliers resulted in a relatively seamless integration. The vineyard team didn't 'see' a lot of the integration, so even better.
- The learning curve was quite steep, but Felipe is a data driven viticulturist and with regular supplier meetings was able to make it all work in a satisfactory timeframe.

AirBorne Logic UAV used for image capture at Rellia vineyard

Outcomes of ag tech use

- A step toward higher-quality grape production and wine output.
- Increased uniformity in vine yield and improved overall health.
- Real-time weather and soil moisture data from Ag Logic hardware fed into, and optimised, the irrigation scheduling in the SWAN systems platform.
- Merging of multiple data sources and integration into Airborne Logic platform was another supplier collaboration success i.e. SWAN, MAIT, Ag Logic.
- Risk models for disease based on the collected weather data assisted vineyard management decision making.
- More efficient irrigation is not necessarily less water applied.
- Time of irrigation is more important and more achievable with an integrated system; knowing when to finish watering is as important as knowing when to start.



Crop water demand vs irrigation applied (ML/h, including reserves and rainfall)

ROI

- Return on investment evaluation of the adoption of these agtech solutions is not solely a financial consideration. Attracting talented staff to work in vineyards and agriculture requires tools that entice people to work in this space. Increasing job satisfaction through the streamlining of processes through the adoption of technology and the modernisation of operations is one such example. Job satisfaction is also increased when peace of mind is increased by having data informed decision making and recording keeping.
- A move away from rule of thumb irrigation rules (such as 6 h/wk for sparkling wine and 4 h/wk for table wine) to weather (particularly evapotranspiration) and crop water demand driven dynamic irrigation scheduling should achieve target yield and quality parameters, although these are notoriously challenging to measure in wine.

ROI continued

- Integration of data layers into the Airborne Logic platform has also increased the availability of data for irrigation decision making, as well as a range of other operational decisions. Layers such as EM soil conductivity maps, soil test results, plant cell density (PCD), normalised difference vegetative index (NDVI) and yield maps can now be interrogated in the one platform
- The SWAN Systems platform has proved useful for the integration of soil type, soil moisture and weather data from Ag Logic, and irrigation data from the MAIT system through 'invisible' APIs. All this data feeds into the irrigation schedules produced by the system.

Capital costs (2023)		
Ag Logic weather station	$6,500	$
Weather station installation	$450	$
Ag Logic 120 cm probe	$3,090	$
Probe installation	$300	$
Total cost	**$10,340**	$
Payback period		
How much time is spent on the task now?	12	h/wk
How much time will be spent on the task after the ag tech is adopted?	4	h/wk
How much time is saved by the ag tech?	**8**	**h/wk**
How many weeks/year is this task performed?	20	wk
How much does the labour cost for this task?	$75	$/h
How much could the ag tech save (labour savings)?	**$12,000**	**$/y**
Estimated ag tech life expectancy	10	y
Purchase price + installation?	$10,340	$
Estimated annual R&M cost?	$50	$/y
Estimated annual running costs (subscription/hosting/telemetry)?	$6,150	$/y
What is the estimated total cost of the ag tech?	**$72,340**	**$**
Estimated annual saving over the life span of ag tech	**$12,000**	**$/y**
Payback period	**6**	**y**

Positives

- Regular meetings of the SWAN Systems, Ag Logic and Josef Chromy vineyard teams to review data and refine interpretations to inform irrigation scheduling adjustments were essential to achieving these outcomes.
- The integration between SWAN and Ag Logic's Wildeye systems made for a very user-friendly Josef Chromy experience.

Negatives

- Introducing the Athena IR-Tech Trans-IR Solution in addition to SWAN Systems and Ag Logic hardware and software was not necessary for driving irrigation decisions in a commercial setting. This was an agtech demo project decision rather than a grower-led decision.

Conclusions

- **An essential component of using a range of agtech solutions to solve one issue is talking between the systems e.g. SWAN, MAIT, Ag Logic. 'Talking' refers not only to hardware and software being compatible, but also to the people from the different suppliers. The decision to adopt or not could likely be based on the ability to integrate.**
- **Agtech is not set and forget. The seasons change and the system needs to be reviewed and likely tweaked each season. This is the case in vineyards, even though they are perennial crops.**
- **Is the supplier keeping an eye on things in the background for the grower or does the grower need to be the one monitoring the data? This is a good question to ask during the adoption/sales process and figured into adoption decision making.**
- **The agtech provider must provide the post-sales customer support. This should be a focus for the supplier as this is critical to adoption success. No one size fits all for every customer in agriculture or viticulture. The operational and growing environments are different for every operation, with varying degrees of modernisation and technical ability on the management team.**

Felipe Bustamante, Relbia vineyard manager

Enviropro soil moisture probe and Wildeye telemetry unit, supplied and installed by Ag Logic.

Kellie Graham is an experienced vineyard manager and viticulturist with a strong background and track record in the Tasmanian wine industry. She has not only managed premium vineyards in the state but also contributes back to industry, being chair of the Wine Tasmania technical committee for several years and hosting an agtech demo vineyard in association with Wine Australia. Kellie's experience spans all aspects of vineyard operations, leadership and management, budgeting, planning, project management and environmental compliance. She is committed to sustainable operational practices, including leveraging technology and effective people management. Kellie holds an Associate Degree in Applied Science - Winegrowing and a Diploma of Leadership and Management.

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